# Abstract

The technological advances in wireless networks, smartphones, social networks, embedded sensor technologies and the wide spread of mobile devices have exposed customers to number of services. With these advanced technological innovations, computing capability and connectivity, customers look forward to get useful services and information by means of their mobile devices anywhere and at anytime thereby saving time and money. The importance of mobile commerce is increasing every day, since the mobile devices are becoming central part of our lives. One of the challenge here is the ability to reinforce the application behavior by utilizing context information. The analysis and utilization of context information is necessary to build intelligent applications and thereby focusing on less user attention by understanding the current situation.

The information about the current location of a mobile customer, the time of request, and personal characteristics like nature of work, profession and economic status are utilized by applications to provide accurate context-aware services. Many of context-aware applications focus mainly on user activity, preferences which is not sufficient to provide context-aware intelligent services. However, there are few works in developing an integrated model for analyzing the context information. Many authors describe the context representation using five elements like who, what, where, when and how to provide a user centric view without emphasizing on the feature of generality and structural representation of context parameters. Since context information takes multiple forms, it is essential and necessary to make broad classification which helps application designers and developers to deal with possible contexts and their impact on application behavior. In addition, the context classification enables to

understand complex customer situations due to changing mobile environment. Therefore, it is required to design a model which analyzes the context information of customers in a dynamic environment and hence, provide real time accurate service.

The design and development of context-aware mobile commerce services requires a general conceptual model which can handle any type of context information for different applications. Due to the dynamic nature of business environment and also the customer preferences keep emerging, there is a need to develop business model which adapts to changing environment. To understand the current situation of customers in such highly dynamic environments and to enable the business transactions quickly among parties involved, it is essential to construct and analyze an integrated view of information from distinct sources. The adaptation of the provided services based on customer needs depends when the relevant context information is self-described in the form of beliefs. The observations made on combination of context information are deduced into beliefs as a result the decision making time to provide service reduces considerably.

The aim of the thesis, is to design and develop a context-aware system which has been applied for mobile commerce environment by considering the customer context information. To do this, we have designed two models: the Context-Information, Observation and Belief (C-IOB) model and the commercial business model. The main function of C-IOB model is to support the application to identify a suitable context-aware service and to execute business transaction for a customer by analyzing the context information in the form of beliefs. We classify the used Context Information (CI) into four types: physical, system, application and social environment. The business model discusses the formal description of particpants who are involved in commercial business.

**The C-IOB model**

The Context Information, Observation and Belief model deduces beliefs on customer, by

combination of available context information during transaction execution or service provision. The beliefs represent the various situations of customers based on specific nature of the applications. The beliefs developed about an entity (e.g., person, place, thing) are primitive in most theories of decision making so that applications can use these beliefs to identify and execute context-aware services. The C-IOB model reduces the solution search space, since the knowledge about an entity is organized using cognitive factors, which maps user context information into real world observations and beliefs, as a result the decision making time by the system reduces considerably. The five CI -constructs: *who, what, where, when* and *how* enable many types of context information acquisition in our work.

**The commercial business model**

A commercial business model mainly involves the formal description of business participants who are involved in commercial business transactions. To meet the growing needs and to fulfill high expectations of customers, it is very important that application designers have to address the issue of building viable business models for commercial environment. The business model describes how an enterprise or an organization captures and delivers economical value to customers. In particular, the customers play major role in transactions execution and hence understanding and identifying the needs of customer is an important issue in building the business model for commercial purpose.

**Mobile Commerce Environment**

Mobile commerce environment (MCE) is one of the specific forms of commercial business model. It deals with transactions like purchases with the objective of supplying commodities like goods and services to customers using mobile devices. A Mobile commerce environment is established by considering set of customers, vendors and bankers, who are involved in commercial business activities like buying of electronic goods and services. The environment is based on certain factors like the type of customers, the type of transactions and the type of electronic products involved in purchasing. M-commerce is one of the most effective and useful ways of conducting business as the customers are constantly using mobile devices

and it significantly assists customers in making transactions anywhere, anytime and thereby improving the customer satisfaction.

**C-IOB model based mobile commerce environment**

Mobile commerce applications are required to be flexible, in providing services due to inherent anytime and anywhere paradigm. The traditional systems during commercial business transactions, take large time to search the right product, which leads to more utilization of device resources like memory and computational power. In addition, the users are striked with more information which is not significant. Therefore, there is a need to design applications, which identify the customer requirements by acquiring the context information from distinct sources and thereby providing timely and specific information or services to the customer. Hence, to adapt services based on various situations, it is required to develop a systematic approach for representation and utilization of context information modified to special characteristics of mobile commerce applications. The mobile commerce environment uses C-IOB model for analyzing the relevant context information of customers and the context based beliefs helps to identify a suitable service for an end customer, thereby reducing mobile transaction execution time and providing customer benefits.

The simulation environment consists of 10,000 electronic products which are categorized based on technical and commercial features. The simulation is carried out with ten mobile commerce transactions, the database consists of information about 500 customers and 100 vendors who deal with electronic products selling and 10 bankers for money transactions. The customer context information is acquired from physical, system, application and social environmet. When customer sends a request for a service, the current context information is acquired, a set of observations is formulated and belief is deduced. The customer is provided with relevant information or service based on deduced belief. The simulation exhaustively tests the working of the system for mobile commerce transactions under different context environments. Some of the case studies are designed by applying the C-IOB model which includes placing the purchase order for the product, money transfer and after sales service.

In summary, we have developed a context-aware system by using C-IOB model and also the design of commercial business model. To evaluate the performance of the system, we have incorporated context-awareness aspect for 10 business transactions applied to mobile commerce. The proposed system using C-IOB model provides customer required services as accurately as possible. The system has the capability to adapt to real time situation of customer needs, thereby enhancing the customer satisfaction. The simulation results have shown that the time to execute mobile commerce transactions is less using context based beliefs compared to context unaware approach. The accuracy of the system with belief based approach is higher than without context information. The customer benefits in business transaction are also enhanced by our design approach.